RAND WATER

Quarterly Water Quality Status of the Vaal Dam Reservoir Catchment

1 January 2015 - 31 December 2015

Sample Points	Sample Point Description	Ammonia	Chloride	Fluoride	M-Alkalinity	Nitrate	Phosphate	Sulphate	Chemical Oxygen Demand	Conductivity	pH	*E. coli*
VSS	Sandspruit below Vaal River @ Kliplaatsdrift 27°12'30.82"S 29°26'12.83"E	0.43	<10	0.28	115	0.68	0.18	18	14	30	8.00	
		<0.5	9	0.26	178	0.18	0.20	34	12	40	8.35	
		<0.2	15	0.32	190	4.20	<0.1	41	15	47	8.55	
KB	Klip River @ Barnardskop 27°28'12.33"S 29°36'1.76"E	0.15	<10	0.13	48	0.28	0.08	9	14	15	7.40	
		0.62	6	0.22	57	0.58	<0.2	5	11	14	7.60	
		<0.2	11	0.23	117	<0.1	<0.1	20	15	30	7.83	
KW	Klip @ Winkelhaak 27°14'41.55"S 29°23'59.91"E											
KD	Klip River @ De Langesdrift 27°10'57.77"S 29°14'5.54"E	0.15	<10	0.16	86	<0.1	0.08	10	15	20	7.80	
		<0.5	8	0.32	173	0.23	<0.2	22	11	36	8.04	
		<0.2	10	0.24	215	0.15	<0.1	16	20	48	8.09	
		0.27	15	0.49	247	1.51	<0.2	19	13	51	8.17	
KSV	Spruitsonderdrift downstream of Vrede 27°21'8.15"S 29°10'16.87"E	0.15	20	0.34	170	0.14	0.08	28	26	43	8.60	
		<0.5	23	0.31	182	1.60	<0.2	37	40	44	8.69	
		<0.2	49	0.34	262	6.43	0.66	63	27	67	7.78	
		<0.2	50	1	345	1.37	1.0	32	31	80	8.22	
VDS	Vaal River downstream of Standerton 27° 0'55.97"S 29° 1'29.30"E	0.15	<10	0.23	105	0.28	0.08	16	20	28	7.80	
		<0.5	17	0.28	145	1.40	<0.2	40	23	39	7.75	
		<0.2	23	0.26	118	0.50	0.25	42	21	34	7.76	
		<0.5	20	0.48	110	2.00	<0.2	37	21	32	7.55	
VGB	Gladdedrift Bridge @ Villiers 26°59'31.24"S 28°43'47.18"E	0.25	<10	0.30	105	0.18	0.35	19	18	27	7.80	
		<0.5	12	0.31	145	0.56	<0.2	33	21	42	7.99	
		<0.2	16	0.29	128	0.49	<0.2	36	23	38	8.07	
		1.30	15	0.40	143	0.41	<0.2	40	31	39	8.06	
VV	Vaal @ Villiers 27° 1'20.13"S 28°36'0.32"E	0.25	10	0.31	100	0.83	0.18	23	21	27	7.80	140
		<0.5	18	0.40	140	0.32	<0.2	34	23	36	8.14	23962
		0.31	22	0.32	141	0.25	<0.1	36	21	40	8.27	490
		2.73	23	0.50	143	1.02		47	23	49	7.79	1204
VD4I	Vaal Dam 4 Integrated - Vaal River upstream of Vaal Marina 26°53'27.99"S 28°15'0.16"E	0.25	12	0.28	105	0.12	0.13	30	19	29	8.30	4
		3.40	14	0.26	101	0.12	<0.2	29	17	27	8.07	1
		0.10	10	0.27	80	0.51	<0.1	21	26	22	7.90	1
		2.00	8	0.45	89	0.19	0.46	19	20	24	7.95	4
WF	Wilge River @ Frankfort 27°16'18.00"S 28°29'28.41"E	0.25	<10	0.11	52	0.53	0.15	9	14	13	7.50	720
		3.40	4	0.24	47	0.34	0.84	10	11	11	7.60	524
		0.10	4	0.22	43	0.69	<0.1	8	18	12	7.49	126
		2.00	1	0.95	68	0.30	<0.2	6	22	16	7.65	190
VD3I	Vaal Dam 3 Integrated - Wilge River downstream of Oranjeville 26°59'1.64"S 28°13'25.08"E	0.41	<10	0.08	60	<0.1	0.10	12	12	15	8.00	3
		<0.5	5	0.16	61	0.22	0.23	11	11	15	7.74	5
		0.33	3	0.23	59	15.58	<0.1	17	18	15	7.57	18
		1.47	12	0.61	57	0.19	0.23	8	16	14	7.96	9
VD2I	Vaal Dam 2 Integrated - Confluence of Vaal & Wilge 26°53'48.81"S 28°11'9.92"E	0.40	<10	0.16	69	<0.1	0.13	16	13	18	8.00	1
		<0.5	7	0.19	70	0.22	<0.2	16	12	18	7.82	0
		<0.2	6	0.24	67	0.22	<0.1	17	20	19	7.87	2
		0.78	4	0.48	62	0.31	0.24	11	13	22	7.30	3
VD1I	Vaal Dam 1 Integrated @ RW intake 26°53'0.26"S 28° 7'14.35"E	0.25	<10	0.18	65	0.26	0.12	17	10	18	8.00	4
		<0.5	7	0.19	69	0.19	0.20	16	14	18	7.77	46
		9.20	10	0.24	70	3.57	0.80	20	18	20	7.86	9
		<0.5	5	0.30	67	0.39	0.50	47	14	20	8.02	8
C-KLIPR_VDAM	Klip River inflow to VaalDam 27°07'43.93"S 28° 17'01.47"E	0.25	<10	0.25	66	0.75	0.18	15	96	17	7.90	
		0.50	14	0.29	104	0.56	0.29	27	40	26	7.90	
		0.26	12	0.28	132	0.32	0.10	18	36	33	8.00	
		1.45	15	0.49	183	1.66	0.54	22	34	49	7.97	
S-ST_NEW	Standerton Sewage Works 26°58'24.60"S 29°13'52.87"E	7.60	48	0.17	140	1.40	2.80	51	38	60	7.40	24
		7.00	38	0.36	133	3.23	2.37	62	38	52	7.21	5163
		<0.2	43	0.30	88	6.14	0.70	67	57	60	7.48	513
		13.30	40	0.58	212	12.00	3.03	54	329	68	7.46	675672
S-DENEYSVILLE	Final Effluent of Deneysville WWTW 26°53'06.29"S 28°06'42.35"E	3.60	35	0.18	92	13.00	3.30	37	35	46	7.40	120
		11.48	41	0.24	139	5.97	3.45	45	64	55	7.36	6559
		12.05	34	0.23	135	7.70	2.95	28	52	53	7.50	19914
		6.22	56	0.34	105	9.80	2.86	35	59	46	7.38	14187
S-FRANKF_NAMAHA	Final Effluent of Frankfort Namadi 27°15'41.58"S 28°29'29.22"E	13	42	0.08	150	0.64	3.50	39	39	50	7.70	700
		23.00	35	0.17	189	2.65	3.95	42	55	58	7.36	54148
		14.90	32	<0.15	160	3.30	3.43	34	112	55	7.63	1681
		11.13	32	0.40	139	3.38	3.25	32	66	49	7.72	118
S-FRANKF_OXI_P	Final Effluent of Frankfort Oxidation Ponds 27°17'27.44"S 28°29'16.83"E	9.40	63.00	0.29	175	0.21	4.00	42	100	69	8.10	730
		8.43	79	0.28	181	0.30	4.60	38	122	71	8.45	1448
		8.80	67	0.28	202	4.51	3.92	40	91	75	7.82	203
		3.75	74	0.43	208	0.55	3.53	67	76	79	7.79	628
S-ORANJEVILLE	Final Effluent of Oranjeville WWTW 26°58'47.06"S 28°12'35.72"E	4.40	30	0.12	95	6.00	2.90	28	33	40	7.40	14,770
		19.50	35	0.22	139	5.21	3.48	36	77	52	7.37	801,286
		13.14	36	0.27	103	28.94	3.93	37	57	48	7.37	253,651
		9.26	26	0.80	92	10.03	3.55	20	38	43	7.20	270987
S-VAAL_MARINA	Final Effluent of Vaal Marina WWTW 26°53'19.35"S 28°12'50.50"E	0.25	35	0.28	120	5.80	0.85	45	22	48	7.70	18
		15.15	37	0.23	143	5.44	2.33	34	30	53	7.74	847
		0.36	54	0.34	71	12.96	1.63	48	22	54	7.62	912
		<0.5	32	0.26	70	16.47	2.53	36	24	48	7.57	33
S-VILLIERS	Final Effluent of Villiers WWTW 27°01'54.43"S 28°35'21.89"E	11.00	63	0.35	195	5.00	4.00	48	125	73	7.60	611,60
		27.00	49	0.35	269	0.14	4.32	53	126	85	7.48	294,179
		26.00	38	0.28	307	2.30	4.05	34	231	97	7.68	2,404,283
		2.73	23	0.50	143	1.02	33.85	47	23	49	7.79	1204

Sewage Works Compliance (where applicable) to General Standard (GN 1191 Oct 1999)

Sample Points	Sample Point Description	Ammonia		Fluoride		Nitrate	Phosphate		Chemical Oxygen Demand	Conductivity	pH	*E. coli*
S-ST_NEW	Standerton Sewage Works 26°58'24.60"S 29°13'52.87"E	7.60	32	0.17	250	1.4	2.80	42	38	60	7.40	24
		7.00	58	0.36	205	3.2	2.37	71	38	52	7.21	5163
		<0.2	48	0.30	140	6.1	0.70	51	57	60	7.48	512.6666667
		13.30	38	0.58	133	12.0	3.03	62	329	68	7.46	675672
S-DENEYSVILLE	Final Effluent of Deneysville WWTW 26°53'06.29"S 28°06'42.35"E	3.60		0.18		13.0	3.30		35	46	7.40	120
		11.48	29	0.24	88	6.0	3.45	37	64	55	7.36	6559
		12.05	35	0.23	92	7.7	2.95	37	52	53	7.50	19913.5
		6.22	41	0.34	139	9.8	2.86	45	59	46	7.38	14187
S-FRANKF_NAMAHA	Final Effluent of Frankfort Namadi 27°15'41.58"S 28°29'29.22"E	13.00		0.08		0.6	3.50		39	50	7.70	700
		23.00	39	0.17	170	2.7	3.95	39	55	58	7.36	54148.25
		14.90	42	<0.15	150	3.3	3.43	39	112	55	7.63	1680.5
		11.13	35	0.40	189	3.4	3.25	42	66	49	7.72	118
S-FRANKF_OXI_P	Final Effluent of Frankfort Oxidation Ponds 27°17'27.44"S 28°29'16.83"E	9.40		0.29		0.2	4.00		100	69	8.10	730
		8.43	49	0.28	190	0.3	4.60	36	122	71	8.45	1447.75
		8.80	63	0.28	175	4.5	3.92	42	91	75	7.82	202.8333333
		3.75	79	0.43	181	0.5	3.53	38	76	79	7.79	628
S-ORANJEVILLE	Final Effluent of Oranjeville WWTW 26°58'47.06"S 28°12'35.72"E	4.40		0.12		6.0	2.90		33	40	7.40	14,770
		19.50	31	0.22	82	5.2	3.48	29	77	52	7.37	801,286
		13.14	30	0.27	95	28.9	3.93	28	57	48	7.37	253,651
		9.26	35	0.80	139	10.0	3.55	36	38	43	7.20	270987
S-VAAL_MARINA	Final Effluent of Vaal Marina WWTW 26°53'19.35"S 28°12'50.50"E	0.25		0.28		5.8	0.85		22	48	7.70	18
		15.15	30	0.23	130	5.4	2.33	39	30	53	7.74	846.5
		0.36	35	0.34	120	13.0	1.63	45	22	54	7.62	912
		<0.5	37	0.26	143	16.5	2.53	34	24	48	7.57	33
S-VILLIERS	Final Effluent of Villiers WWTW 27°01'54.43"S 28°35'21.89"E	11.00		0.35		5.0	4.00		125	73	7.60	611,60
		27.00	74	0.35	270	0.1	4.32	56	126	85	7.48	294,179
		26.00	63	0.28	195	2.3	4.05	48	231	97	7.68	2,404,283
		2.73	49	0.50	269	1.0	33.8	53	23	49	7.79	1204

Key

VD1I	Vaal Dam 1 Integrated @ RW intake	0.12	-	1 Jan 15 - 31 Mar 15
		0.12	-	1 Apr 15 - 30 Jun 15
		0.12	-	1 July 15 - 30 Sept 15
		0.12	-	1 Oct 1 - 31 Dec 15

Water Quality Guidelines

	-	Ideal
	-	Acceptable
	-	Tolerable
	-	Unacceptable
	-	No sample or result available

In-stream Water Quality Guidelines for the Vaal Dam Catchment

Variables	Measured as	Ideal Catchment Background	Acceptable Management Target	Tolerable Interim Target	Unacceptable
Physical					
Conductivity	mS/m	< 10	10 - 30	30 - 45	> 45
pH	pH units	6.5 - 8.5			< 6.5; > 8.5
Organic					
Chemical Oxygen Demand (COD)	mg/l	< 10	10 - 15	15 - 20	> 20
Macro Elements					
Ammonia (NH_4)	mg/l	< 0.2	0.2 - 0.5	0.5 - 1.0	> 1
Chloride (Cl)	mg/l	< 25	25 - 50	50 - 75	> 75
Fluoride (F)	mg/l	< 0.05	0.05 - 0.20	0.2 - 0.4	> 0.4
Alkalinity	CaCO3 mg/l	< 40	40 - 75	75 - 120	> 120
Nitrate (NO_3)	mg/l	< 0.1	0.1 - 0.2	0.2 - 0.3	> 0.3
Phosphate (PO_4)	mg/l	<0.05	0.05 - 0.25	0.25 - 0.50	> 0.5
Sulphate (SO_4)	mg/l	< 20	20 - 45	45 - 70	> 70
Bacteriological					
Faecal coliforms	counts/100ml	< 10	10 - 60	60 - 120	> 120

Sewage Works Compliance to General Standard (GN 1191 Oct 1999)

Variables	Measured as	Acceptable Management Target	Unacceptable
Physical			
Conductivity	mS/m	<150	>=150
pH	pH units	5.5 - 9.5	< 5.5; >9.5
Organic			
Chemical Oxygen Demand (COD)**	mg/l	<75	>=75
Macro Elements			
Ammonia (NH_4)	mg/l	<3	>=3
Fluoride (F)	mg/l	<1	>=1
Nitrate (NO_3)	mg/l	<15	>=15
Phosphate (PO_4)	mg/l	<10	>10
Bacteriological			
Faecal coliforms	counts/100ml	<1000	>=1000

** After removal of algae